Jute and Silk in India.

Imperial Institute. Indian Trade Inquiry: Reports on Jute and Silk. Pp. ix + 90. (London: John Murray, 1921.) 5s. net.

THESE reports embody the results of the work of special committees, formed, in response to the invitation of the Secretary of State for India to the Imperial Institute Committee, to inquire into the possibilities of further commercial usage of the principal Indian raw materials in the United Kingdom and in other parts of the Empire.

The commercial production of jute is confined to Northern India, including Assam. The fibre is obtained from the inner bark of the stems of two annual plants, *Corchorus capsularis* and *C. olitorius*, members of the family Tiliaceæ, and the crop is raised on small holdings by the Indian ryot. More than 60 per cent. of the total crop is consumed in the Indian jute mills, the remainder being exported to the United Kingdom, various Continental countries, and the United States.

In its recommendations the committee has kept in view two main objects, namely, to make use of our practical monopoly of jute to further the interests of the Empire, and to increase the output, and thereby steady and keep at a moderate level the price of the raw product. It recommends an export duty on raw jute leaving India with a rebate in full to consumers within the Empire, the revenue from the duty to be devoted to the establishment of a scheme for the investigation of problems affecting the production in India of jute and allied fibres. As soon as seed-selection experiments are sufficiently advanced the Government should provide each grower with seed sufficient for the season's crop and adopt means to ensure that none but approved seed is sown. Machinery should be set up to deal with the situation arising from a short crop. The production of Bimli jute (the fibre of *Hibiscus cannabinus*) should be encouraged, and means adopted to improve the condition in which it reaches the market.

The position of India among the silk-producing countries is unduly low; natural advantages are not fully utilised, and, at present, the industry is not able to meet local demands. For many years the mulberry silk industry in India has been steadily declining. The committee recommends the establishment by the Government of India of a central Sericultural Institute, the functions of which should include the training of men to develop sericulture in India, the supply of disease-free "seed" of approved native and foreign races of worms, the testing of new races and the production of hybrid races, and the investigation of silkworm and mulberry diseases. Smaller institutions should be established in all important sericultural districts. The committee considers that the enhanced value of Indian silk that would result from a radical improvement in its quality should render it possible for the Indian product to compete successfully with Japanese and Chinese silks.

Valency and Atomic Structure.

Valenzkräfte und Röntgenspektren: Zwei Aufsätze über das Elektronengebäude des Atoms. By Prof W. Kossel. Pp iv + 70. (Berlin: Julius Springer, 1921.) 12 marks.

THE literature on atomic structure has received an interesting addition by the publication of this little work, which consists of two essays, the first being entitled "The Physical Nature of Valency Forces," and the second "The Significance of X-rays in the investigation of Atomic Structure." Berzelius first put forward the theory of the electrical nature of valency forces, but the difficulty of explaining homopolar combination by means of it had led to its being discredited. It has now come to the fore again as the result of our knowledge of the relation between atomic number, the charge on the nucleus of the atom, and the place of the atom in the periodic series, and in its recent developments Kossel has played an important part.

In the first paper, after referring to the various atomic models which have been proposed from time to time, Kossel points out that we can explain many of the chemical properties of the elements if we assume a tendency on the part of the atom to lose or gain electrons, so as to revert to more stable electron configuration. In losing or gaining electrons the atom becomes a charged ion, and without knowing anything further of its structure it is possible to explain the formation of a large number of compounds. The valency forces correspond to an electrostatic field surrounding the ion, such as would arise from a charge placed at the centre of the atom. The molecule as a whole must be electrically neutral, but neutral molecules may have oppositely charged atoms at different points in their structure, and so may attract other neutral molecules with the formation of complex compounds. Kossel makes no attempt to explain the way in which homopolar compounds are formed; he merely indicates the lines along which investigation may be possible. He emphasises the point, however, that the study of organic com-

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pounds has led to an excessive importance being attached to valency phenomena in homopolar compounds, whereas a complete theory should cover the very large class of inorganic heteropolar compounds formed by the majority of the elements.

The second essay is a short review of the work which has been done on X-ray spectra and the origin of X-rays, with particular reference to the partitioning of electrons into shells surrounding the nucleus.

The author's style is somewhat involved, and for a reader who is not a good German scholar the argument is sometimes difficult to follow.

Our Bookshelf.

(1) *Abridged Callendar Steam Tables, Centigrade Units.* By Prof. H. L. Callendar. Pp. viii. 1*s.* net.
(2) *Abridged Callendar Steam Tables, Fahrenheit Units.* By Prof. H. L. Callendar. Pp. 8. 1*s.* net.
(3) *Callendar Steam Diagram, Centigrade Units.* 6*d.* net.
(4) *Callendar Steam Diagram, Fahrenheit Units.* 6*d.* net. (London: E. Arnold, n.d.)

THE two sets of abridged tables (1) and (2) will be found to contain all that is required for engineering calculations. Table 1 in each set contains the properties of saturated steam for pressures ranging from 28·98 in. of vacuum up to 535·31 lb. per sq. in. gauge pressure. Table 2 gives the total heat of dry steam (superheated or supersaturated), and table 3 contains the entropy values for dry steam at various degrees of superheat and supersaturation. On the first and last pages will be found notes of the symbols and equations employed. The tables are well arranged and clearly printed, and will be of great service to students and engineers in practice.

(3) The Centigrade steam diagram is also well arranged and has convenient scales. (4) The curves on the Fahrenheit steam diagram are copied from those on the Centigrade diagram; the numerals printed on them are the corresponding Fahrenheit numbers. Hence the scales on the Fahrenheit diagram are not so convenient, and we think it would have been better had this diagram been drawn independently of the Centigrade diagram.

Spot and Arc Welding. By H. A. Hornor. (Griffin's Technological Handbooks.) Pp. vii+296. (London: Charles Griffin and Co., Ltd., 1920.) 15*s.*

THE application of electric welding processes to heavy steel construction, such as obtains in shipbuilding, forms the main topic of this book. The results of extensive tests conducted during the war in the United States with the object of testing the processes are also given. This work was, unfortunately, discontinued at the time of the armistice, but from the results it was shown that trustworthy electrically welded joints can be made of greater strength than corresponding riveted joints, and that consequently some economy in material can be expected. Special designs for all-welded ships are discussed, and a good deal of interesting information is given on other applications of both spot and arc welding and the training of welders. Small all-welded craft have already been constructed in England, and the author shows that the technical knowledge now available is sufficient for a considerable extension of this method of ship construction.

Handbuch der biologischen Arbeitsmethoden. Edited by Prof. Dr. Emil Abderhalden. Abt. 5, *Methoden zum Studium der Funktionen der einzelnen Organe des tierischen Organismus.* Teil 7, Heft 1, Lieferung 12, *Sinnesorgane.* Pp. 195. (Berlin und Wien: Urban und Schwarzenberg, 1920.) 30 marks.

THE "Handbuch der biologischen Arbeitsmethoden," edited by Prof. Emil Abderhalden, will consist of forty-eight parts, in which chemical, physical, biological, psychological, and many other methods are treated at considerable length. The section under notice, by E. Budde, is devoted to the mathematical theory of audition. The first division of this contains a very full discussion of free and forced small vibrations of a point, followed by systems under non-linear forces, including combination tones. The second division deals with strings and membranes, while the third refers to plane-waves in air. Having thus laid the foundation, the author passes to the detailed treatment of human audition, in which he reviews the interpretations of the phenomena put forward by the chief workers on the subject, but dwells especially on the parts played by the basilar membrane and the endolymph.

Turbines. By A. E. Tompkins. Third edition, entirely revised. Pp. viii+180. (London: S.P.C.K.; New York: The Macmillan Co., 1921.) 8*s.* net.

THE early part of this book is taken up with historical notes and some explanations of the principles involved in the working of turbines. This is followed by three chapters on water-wheels, turbine pumps, and water turbines. The remainder of the book deals with steam turbines. For the most part the book is descriptive, and the simple language employed, together with the many excellent drawings, will render the volume of interest to the general reader. The author has had considerable experience in the working of turbines, and his treatise on "Marine Engineering" is well known. It is therefore rather surprising to find on p. 21, in reference to a rotating wheel, that "every particle of the wheel also tends to fly away from the axis in a radial direction, due to centrifugal action or force." This statement is somewhat misleading. There are one or two misprints, and the accepted notation for British thermal unit is B.Th.U., not b.t.u.

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